CHASSIS Lubrication — Lubricate for SAFETY every 1,000 MILES

The Institute Spokesman

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Wishing You
A Very Merry Christmas
and
A Bright and Prosperous New Year

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Technical Data

CLASSIFICATION, COMPOSITION AND USES OF GREASES

Classification	Class Name	COMPOSITION			Remarks and Recommendations
		Alkali	Fats	Mineral Oil	
According to Soap Base	Lime-base.	Calcium hydroxide (Slacked lime) $Ca(OH)_2$	Horse, hog, bone, wool, fats; fish, rape (colza), castor, palm, neatsfoot, cotton seed, soya bean, sperm, rosin oils; beef, mutton, vegetable tallows; esters of stearic, palmitic and oleic acids.	Various lubricating oils ranging from light spindle to heavy, dark residuum oils, depending on the purpose for which the grease is made.	General purposes greases containing usually from 70 to 90 percent mineral oil; widely used in compression grease cups, gear boxes, etc., in industrial plants. Not suitable where operating temperatures exceed 175° F., nor where they are subject to high speeds or churning action, because high centrifugal force incident to high speeds tends to separate the water and soap-oil mixture, thereby permitting the mineral oil and soap base to separate. Not suitable for anti-friction bearings that operate at high speed and temperature conditions. They are water repellent.
	Sodium-base	Sodium hydroxide (Caustic soda) NaOH	Same as for lime-base greases.	Same as for lime-base greases.	Suitable for high temperature and speed conditions as they do not contain water as a binding agent. Not recommended for use in the presence of water because they readily emulsify with it. Suitable for anti-friction bearings operating at high speed and temperature conditions, for plain bearings and in centralized pressure lubrication systems where a light product of non-separating characteristics is required to avoid clogging of the supply pipes. Suitable for wheel bearings, universal joints, steering gear and spring shackles of automobiles.
	Aluminum-base.	Generally sodium or potassium hydroxide used with oleic or stearic acid to form sodium oleate or stearate which in turn is combined with aluminum sulfate to form aluminum oleate or stearate.	Oleic and stearic acids, acidless tallow, castor oil and sodium naphthenate.	Various lubricating oils, ranging from light spindle oils to cylinder stocks.	Combine some of the advantages of both lime- and sodium-base greases. Are water repellent; withstand high temperatures; do not separate when agitated or used in centralized pressure greasing systems. Usually brilliant and transparent in appearance; often referred to as solidified oils or transparent cup and pressure gun greases. Used where operating temperatures and speeds are high. For example, rocker arms of aeroplane motors, high-speed gears, and many other applications where grease is applied by means of a pressure grease gun. They are non-spattering and are used where such a lubricant is demanded.
	Lead-base.	Lead acetate, lead monoxide (litharge), sodium hydroxide.	Oleic and stearic acids; fish whale, castor, rosin, neatsfoot, nut, linseed oils; naphthenic acids, etc.	Especially selected lubricating oils. Heavy black oils are not suitable.	These greases are usually classified as "extreme pressure" lubricants because of their ability to withstand high pressures. They are sometimes used as a compound in transmission greases, especially those intended for use in worm and Hypoid sets. They do not emulsify nor dissolve in water, but tend to settle out in the presence of water when in dilute solution in mineral oil.
	Zinc-base.	Zinc oxide zinc acetate, sodium hydroxide.	Sodium oleate and sodium stearate.	Same as for lime-base greases.	These greases are water repellent and are frequently used for lubricating the plungers of hydraulic elevators, piston rods of water pumps, slushing compound for preventing the rusting of wire cables that operate in water. These are frequently referred to as hydraulic greases.
	Mixed-base.	Calcium hydroxide+sodium hydroxide, potassium hydroxide+calcium hydroxide, aluminum hydroxide+sodium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Used where conditions do not permit using lime-base or sodium-base greases, such as high-speed bearings in the presence of moisture. Mixed-base greases combine to a certain degree characteristics of the individual soaps used in the admixture.
According to Manufacturing Methods	Cooked or Boiled.	Same as for lime-, sodium-, aluminum-, lead-, zinc-, and mixed-base greases.	Same as for lime-base greases.	Same as for lime-base greases.	The bulk of greases are manufactured by cooking or boiling. Cup, sponge, fiber and many other greases are made by this method. In general, all of the better grade greases fall under this classification. They are used for a wide variety of services as indicated above.
	Cold Sett.	Calcium hydroxide.	Rosin acid	Usually dark lubricating oils.	These greases in general are of the cheaper grade. They are commonly used to lubricate rough machinery in steel mills, coal mines, skids, launching ways, track curves, etc. They should never be used on brass bearings as they cause corrosion.
	Residuum.	None.	Generally none.	Dark, heavy oils, residuum or bottoms, and sometimes cylinder stocks.	Sometimes an animal or vegetable oil is added as well as tar, rosin oils, etc. Made in a wide range of consistencies; very adhesive and tacky. Used for lubricating wire cables, open gears, steel-mill roll necks, etc. generally applied hot by swab or brush.
According to Consistency	Fluid No. 0.	Usually same as those listed above under aluminum-base greases.	Same as for lime-base greases.	Generally light and medium viscosity lubricating oils.	Many of the so-called "solidified," "dripless" or "non-spattering" greases fall into this class. Such products are generally mineral oils thickened with usually less than 5 percent aluminium soap. Used where non-spattering characteristics are desired, such as in textile mills, bakeries, food-preparation establishments, and chain drives, speed reducers, cranes, circulation systems of gyratory rock crushers, wood-working machinery, etc.
	Very soft No. 1.	Same as for No. 3.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	Recommended for conditions similar to soft greases but where temperatures are lower and speeds generally higher. Soap content is usually very low.
	Soft No. 2.	Same as for No. 3.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	Used for light duty line-shaft bearings, ball and roller bearings, gear boxes, and in general where application is by means of grease cups and pressure guns.
	Medium No. 3.	Sodium, calcium, aluminum hydroxides singular and in combination. Also, lead and zinc alkalies.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above	This consistency is widely used in many different plants and industries. Under certain operating conditions it is suitable for ball and roller bearings, line-shaft bearings, pumps, crushers, grinders, farm machinery, elevators, excavating machinery, machine tools, ceramic machinery, etc.
	Hard No. 4.	Usually sodium or calcium hydroxide.	Same as for lime-base greases.	Various lubricating oils. See lime-base greases above.	Recommended for bearings in heavy duty such as coal conveyors, cranes, hoists, excavating machinery, shears, punch presses, etc.
	Very hard No. 5.	Usually sodium or calcium hydroxide.	Same as for lime-base greases.	Generally dark lubricating oils or cylinder stocks.	Some of these greases have melting points as high as 450° F. Used for very high temperature conditions, such as paper dryers, cement-mill kilns, tube mills, coolers, ball and rod mills and laundry calenders, mangles and ironers.

(To be continued in the next issue)

The INSTITUTE SPOKESMAN

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GEORGE W. MILLER . . . *Editor*
498 Winspear Avenue, Buffalo, N. Y.

NEW BOOKS

THE PRINCIPLES AND PRACTICE OF LUBRICATION

Alfred W. Nash,
M.Sc., M.I., Mech.E., F.C.S.
A. R. Bowen,
Ph.D., D.Sc., F.I.C., A.M.I., Chem.E.
2nd Ed. Revised and enlarged
356 Pages—$7.25

Successful lubrication necessitates the application of scientific principles in the choice and use of oils and in the design of bearings. The latter is usually left to experts in machine design but the choice of lubricants is of the greatest importance to all users of oils, from the car owner to the workshop mechanic. In the past, and unfortunately to some extent today, engineers regarded lubrication as an expensive though necessary practice. They did not appreciate that correct lubrication, involving the use of good grades of oils and also of efficient methods of application, is undoubtedly the cheapest form of insurance against excessive running, maintenance and capital costs than can be introduced into works employing machinery.

The chapters in this volume summarize concisely the salient features of the subject of friction and lubrication and should prove of value to students, engineers, oil salesmen, and all users of machinery. The scientific principles are given in non-technical language as far as possible; and those whose knowledge of chemistry and physics is slight should have no difficulty in following the Authors' reasoning.

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UTILIZATION OF FATS

H. K. Dean, B.Sc., Ph.D. (Liv.), A.I.C.
1938 — $6.00

CONTENTS—CONSTITUENTS AND PROPERTIES OF FATS — Fatty Acids, Alcohols, Sterols, Hydrocarbons and Carotenoids, Chemical and Physical Properties of Fats and Fatty Acids — ANALYTICAL METHODS — General Methods, Special Methods, Determination of Fatty Acid Composition and Glycerine Structure = CLASSIFICATION, COMPOSITION AND ANALYSIS OF FATS — Structural Analysis of Fats, Fatty Acid Composition and Glyceride Structure, Composition of Artificial Fats — ARTIFICIAL FATS — Synthesis of Glycerides, Hydrogenation — EXTRACTION AND REFINING OF FATS — EDIBLE FATS — The Edible Fat Industries, Biochemistry, Rancidity — PAINT AND VARNISH OILS — Drying and Semi-Drying Oils, Vulcanized, Boiled, Blown and Stand Oils, Theory of Drying and Polymerisation — SOAPS AND FATTY ACIDS — Hydrolysis of Fats, Preparation of Fatty Acids, Saponification and Soaps, Physical Chemistry of Soap and Saponification — MISCELLANEOUS APPLICATIONS — Pharmaceutical Fats, Cosmetics, Lubricants, Leather, Sulphonated Oils, Wetting and Emulsifying Agents, Detergents.

Lubrication Data

REAR WHEEL BEARINGS

Lubrication Has Undergone Much Change in Past Few Years—Over-Lubrication To Be Avoided

By WALTER E. BLAINE, *Field Editor, Check Chart*

From both the manufacturer's and service department's viewpoint, the lubrication of rear wheel bearings is a problem that has caused them much grief. If the problem were only one of bearing lubrication, it would be very simple. The major problem is how to prevent the application of too much lubricant, which in the course of time finds its way into the brake drums, making the brakes ineffectual.

Of course, a small amount of lubricant must be provided, either by design or through fittings, grease cups, etc., to replenish the supply at specified intervals. A few years back, the familiar fitting or grease cup was almost universally used for this purpose, and is still used to some extent, but the service department or station has no way of knowing when the wheel bearings were last lubricated—consequently lubricant is applied to fittings, or grease cups are filled every time a car comes into a station for a lubrication job, regardless of whether the manufacturer recommends a mileage of 1,000 or 10,000 miles for replenishing the bearing lubricant. The car is on the hoist, the fittings or grease cups easy to reach, and unless every point on the car is lubricated it isn't a "complete" lubrication job. The final result is ineffective brakes due to excessive lubrication of the rear wheel bearings.

During the last two years the majority of car manufacturers have taken steps to discourage over-lubrication by interior design changes and have greatly extended the intervals between application of the lubricant, where means have been provided to apply it. In many cases screw-driver slotted plugs have replaced fittings. Where fittings are still used they are often of the relief valve type, which permits the excess lubricant to overflow outside. Grease cups are gradually disappearing.

The trend of design is toward making it either unnecessary to lubricate rear wheel bearings at all, or necessary to remove rear wheels for bearing lubrication. Packed-at-assembly rear wheel bearings are being used extensively and some cars are so designed that rear wheel bearings are automatically lubricated from the lubricant in the differential case.

Car manufacturers are by no means in agreement as to how often rear wheel bearings should be lubricated. Where fittings are used, recommended intervals vary from 1,000 to 10,000 miles. Where removal of wheels is necessary intervals recommended by the car manufacturers vary from 5,000 to 30,000 miles. However, the general trend is toward increased mileage intervals for rear wheel bearing lubrication. For instance, on all Chrysler units, which are equipped with plugs, the recommended mileage interval in 1936 was 6,000 miles—15,000 miles is now recommended. Packard, requiring removal of rear wheels for lubrication, now recommends a 30,000 mile interval—10,000 was previously recommended.

Over-lubrication of rear wheel bearings obviously must be avoided. If, before applying lubricant to rear wheel bearings, it were possible to obtain from the car owner or from service records, if he is a regular customer, the mileage at which they were last lubricated, it would go a long way toward avoiding over-lubrication.

Lubrication Oddities

On Cadillac 1936 V-8 models the crankcase oil gage must be so placed that the graduations are on the under side, away from the crankshaft; otherwise an incorrect reading will be obtained. (Models 60, 70 and 75.)

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Late Buick 1938 water pumps have no fittings. The bearings are sealed type, re-

(Continued on page 4)

Committee Line-up

Herewith changes in the names of committees and the appointments thereon made at the last Board of Directors' committee meeting in Chicago on Wednesday morning, October 5.

ENLARGEMENT OF ACTIVITIES

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MEMBER REPRESENTING THE ASSOCIATION IN THE AMERICAN STANDARDS ASSOCIATION

Committee Z-11

M. B. Chittick ..... Pure Oil Company

(Continued from page 3)

quiring no lubrication. Early models do require lubrication.

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Tryon shackles, using fluid gear lubricant, were last used on the 1934 Chevrolet.

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In spite of the very general use of rubber in spring shackles, shock absorber links and other places that were previously lubricated, the number of lubrication points on automobiles has been reduced only to a limited extent.

Hypoid gears were used to only a limited extent until 1937 when a great number of high production cars used them. Further increases in 1938 and 1939 have now made the hypoid gear practically universal on passenger cars.

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A point frequently overlooked on roller bearing universal joints is the spline. Although the joints themselves may only require lubrication at long intervals, in some cases the spline requires attention every 1,000 miles.

Oldsmobile 1937 and 1938 models have spiral bevel gears in the rear axle, yet the manufacturer recommends hypoid lubricant. This is one of the few cars with spiral bevel gears using hypoid lubricant. Others are certain models of Buick and Cadillac.

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Few 1939 water pumps require water pump grease. Prelubricated sealed bearings are used on many models, making water pump lubrication unnecessary, and the spring loaded packings used on others require a lubricant other than water pump grease.

WHAT CAR MAKERS SAY

Latest Factory Recommendations

Lubrication recommendations and procedure are constantly being altered by the car manufacturers as a result of changes in production or because of service experience in the field. The following changes have recently been made by the manufacturers:

Nash 6, 8, LaFayette—1938. Recommended transmission capacity has been changed from 6 to 6½ pt.

Packard 8—1938. The 1938 Packard 8 is to known as the 120 (8), the same model designation as that given to the 1939 Packard 8.

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LUBRICATE FOR SAFETY EVERY 1000 MILES